PROBLEMS FOR SOLUTION.

ALGEBRA.

287. Proposed by WALTER D. LAMBERT, 416 B Street N. E., Washington, D. C.

For what fraction of a year will there be the greatest difference between the interest as computed by the ordinary commercial rule and that computed by the rule of compound interest?

288. Proposed by DR. L. E. DICKSON, Associate Professor of Mathematics, The University of Chicago.

Evaluate the determinant which arises in finding the inverse of the transformation, with binomial coefficients,

$$T: \quad \xi_i = \sum_{j=i}^{g-1} \binom{j}{i} x_j \quad (i=0, 1, \ldots, g-1).$$

GEOMETRY.

320. Proposed by S. F. NORRIS, Baltimore City College.

Lines are drawn from a fixed point P_1, meeting a fixed circle in P_2. On P_1P_2 a point P is taken so that $P_1P \times P_1P_2 = k^2$. Find the locus of P. Solve by analytic methods, using rectangular coordinates, and putting the result in the form,

$$(x_1^2+y_1^2-r^2)[(x-x_1)^2+(y-y_1)^2]+2k^2(x_1x+y_1y-x_1^2-y_1^2)+k^4=0.$$

321. Proposed by J. SCHEFFER, A. M., Kee Mar College, Hagerstown, Md.

Prove by plane geometry the following interesting theorem:

If from a point in the plane of a triangle perpendiculars are demitted upon the three sides of the triangle, and if the area of the triangle formed by connecting the feet of these perpendiculars is denoted by $\triangle'$, *the distance of the assumed point from the center of the circle circumscribed about the original triangle by* R', *the radius of the circumscribed circle by* R, *and the area of the pedal triangle by* $\triangle$, *then will* $\triangle'/\triangle = \pm[(R^2-R'^2)/R^2]$.

CALCULUS.

242. Proposed by J. H. MEYER, S. J., Augusta, Ga.

A given sphere is to be formed into a solid composed of two equal cones on opposite sides of a common base, in such a manner that its surface may be the least possible. Find the dimensions of the solid, and compare its surface with that of the sphere.

243. Proposed by R. D. CARMICHAEL, Anniston, Ala.

The usual method for the solution of a differential equation in the form (see Cohen, *Differential Equations*, p. 22)

$$x^r y^s (my\,dx+nx\,dy)+x^\rho y^\sigma (\mu y\,dx+\nu x\,dy)=0$$

fails when (1) $n=am$, (2) $\nu=a\mu$, (3) $s-\sigma \neq a(r-\rho)$. Find the solution when the relations (1) and (2) hold. (Note that the solution desired does not depend on (3).)